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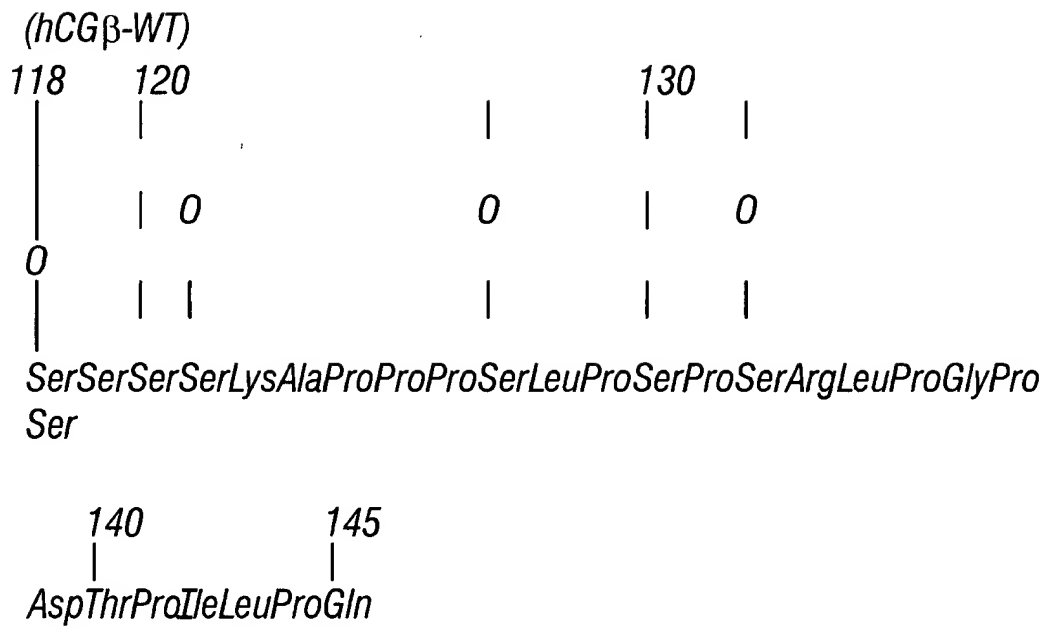


FIG. 2

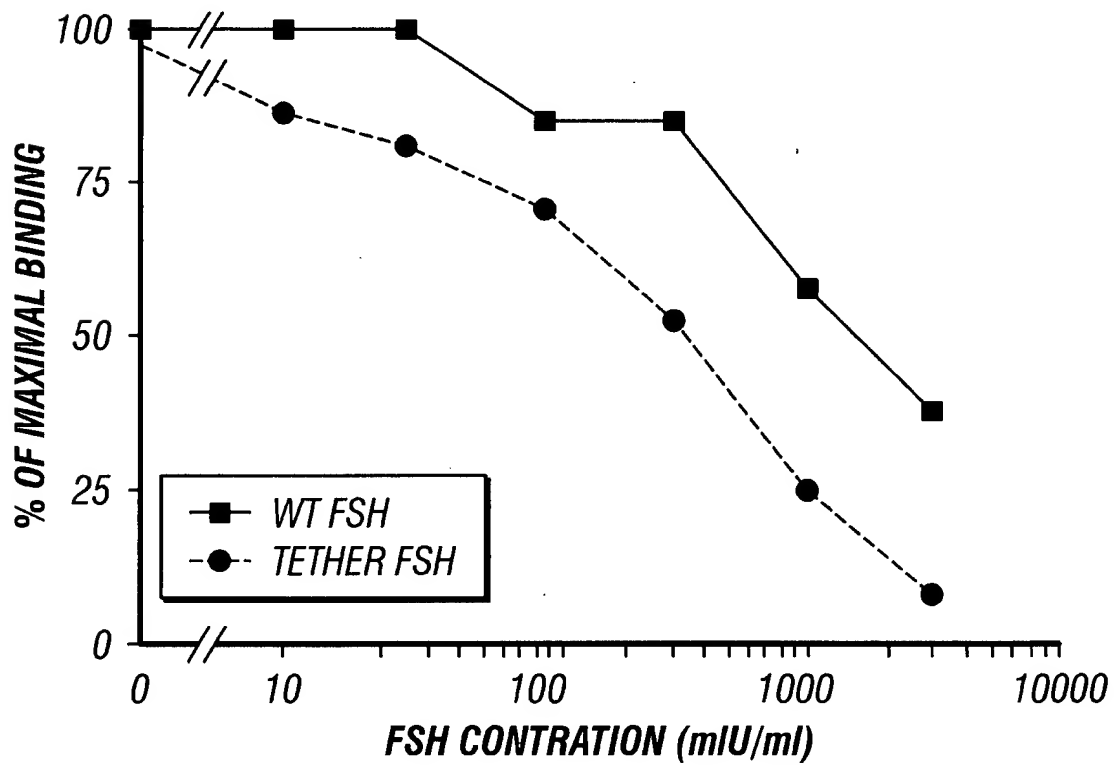


FIG. 3

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D S S S K A P P S L P S P S R L P G P S D T P I L P Q G S G S G S  
 GACTCTTCTCAAAGGCCCTCCCCAGCCTTCCAAGCCCATCCGACTCCCGGGCCCTCGACACCCCGATCCTCCCAAGGATCCGGTAGCGGATCTGGTAGC-  
 CTGAGGAGAAGGAGTTCCGGGAGGGGGTCCGAAGGTTCCGGTAGGGCTGAGGGCCCCGGGAGCCTGTGGGGCTAGGAGGGGTTCTAGGCCATCGCCTAGACCATCG-  
 gggccc (ApaI) ggatcc (BamHI) agc

A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C C F S R A Y  
 GCTCCTGATGTCAGGATTGCCAGAAATGCACGCTACAGGAAACCCATTCTTCTCCAGCCGGTGCCCAATACTTCAGTGCATGGGTGCTGCTTCTCTAGAGCATAT-  
 CGAGGACTACACGTCCTAACGGGTCTTACGTGGGATGTCCTTTGGTAAGAAGAGGTCCGGCCACGGGGTTATGAAGTCACGTACCGACGACGAGAGATCTCGTATA-  
 gct (Eco47III)

P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V T V M G G F  
 CCCACTCCACTAAGTCCAAAGACGATGTTGGTCCAAAGAACGTCACCTCAGAGTCCACTTGTGTAGCTAAATCATATAACAGGTCACAGTAATGGGGGTTTC-  
 GGTGAGGTGATTCAGGTTCTTCTGCTACAACCAAGGTTTCTTTCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATATTGTCCTCAGTGTCTATACCCCCCAAG-

K V E N H T A C H C S T C Y Y H K S \*

AAAGTGGAGAACCACGGGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'

TTTCACCTCTTGGTGTGCCGACCGTGACGTCATGAACAATAATAGTGTTAGAATTCATGGCCTAGGTAGAGTTCGATTAGGCCCT-5'

(KpnI) ggtaccggtatcc (BglII)

FIG. 5B

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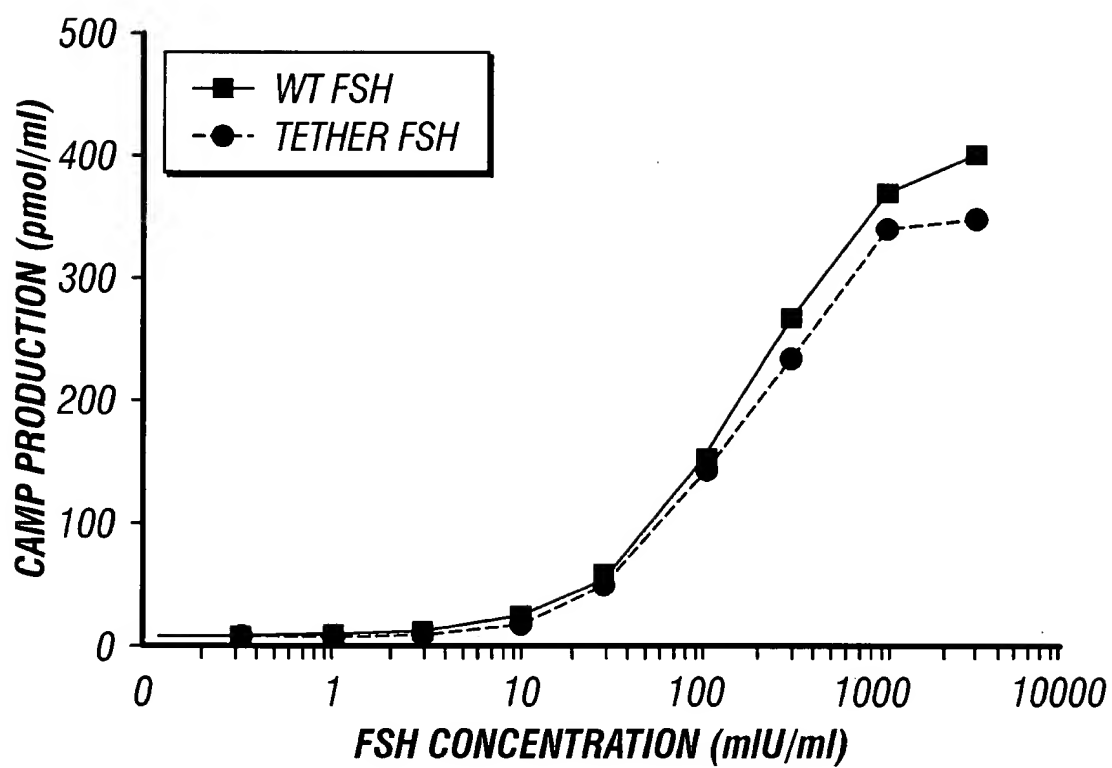


FIG. 4

### Coding Sequence for Single Chain Gonadotropin Analog #1 and Primers

5' - ATGAATCGACGGAATCAGACTCGAGCCAAAGGATGGAGATGTTCCAGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGACATGGGCATCCAAGGAGCCGCTT -  
3' - GGTTCCTACCTCTACAAGGTCCCCGACGACGACAAACGACGACGACTGTAACCCGCCCTGTACCCCGTAGGTTCTCTCGCGGAA -  
ctcqaq (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
CGGCCACGGTGCCGCCCCATCAATGCCACCCCTGGCTGTGGAGAAGGAGGCTGCCCCGTGTGCATCACCGTCAACACCACCACCATCTGTGCCGGCTACTGCCCCACCATTGACC-  
GCCGGTGCCACGGCGGGGTAGTTACGGTGGGACCGACACCTCTTCCTCCGACCGGGGCACACGTAGTGGCAGTTGTGGTAGACACGGCCCGATCAGCGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
CGCGTCTGCAGGGGGTCCCTGCCGGCCCTGCCTCAGGTGGTGTGCAACTACCGCATGTGCGCTTCGAGTCCATCCGGCTCCCTGGCTGCCCGCGCGCGCTGAACCCCGT-  
GCGCACGACGTCCCCCAGGACGGCCGGACGGAGTCCACCACACGTTGATGGCGCTACACGCCAAGCTCAGTAGGCGCGAGGACCGACGCGCGCGCGCGCACTTGGGGCAC-

V S Y A V A L S C Q C A L C R S T T D C G P K D H P L T C D D P R F Q  
GTCTCCTACGCCGTGGCTCTCAGCTGTC AATGTGCACTCTGCCGCCG CAGCACCACTGACTGCCGGGGTCCCAAGGACCA CCCCCTTGACCTGTGATGACCCCCCGCTTCCAG-  
CAGAGGATGCCGGCACCGACATCGACAGTTACACGTTGAGACGGCGGGCGCTGTGGTCACTGACGCCCCCCAGGGTTCTCTGGTGGGGA ACTGGACAC TACTGGGGGCGGAAGGTC-

Coding Sequence for Single Chain Gonadotropin Analog #2 and Primers (underlined)

5' - ATGAATCGACGGAATCAGACTCGAGCCAAAGGATGGAGATCTCCAGGGCTGCTGCTTCTGCTGCTGAGCATGGCGGGACATGGGCATCCAAGGAGCCGCTT -  
3' - GGTTCCTACCTCTACAAGGTCCCCGACGACGACAACGACGACGACTGTACCCGCCCTGTACCCGTAAGTTCTCTGGCGAA -  
ctcqaq (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
CGGCACGGTGCCGCCCCATCAATGCCACCTGGCTGTGGAGAAGGAGGGTGCCCCCGTGCATCACCGTCAACACCACCATCTGTCCCGGTACTGCCCCACCATGACC-  
GCCGTTGCCACGGCGGGGTAGTTACGGTGGACCGACACCTCTTCTCCCGACGGGGCACACGTAGTGGCAGTTGTGGTAGACACGGCCCGATGACGGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
CGCTGCTGCAGGGGTCTGCCGGCCCTGCCTCAGGTGGTGCAACTACCGGATGTGCGCTTCGAGTCCATCGGCTCCCTGGCTGCCCGGGCGGCGTGAACCCCGT-G  
GGCACGAGCTCCCCAGGACGGCCGGGACGGAGTCCACACACGTTGATGGCGCTACACGCGAAGCTCAGGTAGGCCGAGGACCGACGGCGCGCGCACTTGGGGCAC-

V S Y A V A L S C Q C A L C R R S T T D C G P K D H P L T C D D P R G S  
GTCTCTACGCCGTGGCTCTCAGCTGTCATGTGCACTCTGCCGCCGACGACCACTGACTCGGGGGTCCCAAGGACCACCCCTTGACCTGTGATGACCCCGGGGATCC-  
CAGAGATCGGCCACCGACAGTCGACAGTACAGTACAGTGAGACGGCGCGCTCGTGGTGACTGACGCCCCCAAGGTTCTGGTGGGGAACCTGGACACTACTGGCGGCCCCCTAGG-  
(SstII) ccgcggggatcc (BamHI)

**FIG. 6A**

G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C  
GGTAGCGGATCTGGTAGCGCTCCTGATGTGCAGGATTGCCAGAAATGCACGCTACAGGAAACCCCAATTCTTCGCCAGCCGGTGCCCCAATACTTCAGTGCATGGGCTGC-  
CCATCGCCCTAGACCATCGCGAGGACTACACGTCCCTAACGGGTCTTACGTGCGATGTCCCTTTGGGTAAAGAGGGTCCGCCACCGGGTTATGAAGTCACGTACCCCGACG-  
agcgct(Eco47III)

C F S R A Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V  
TGCTTCTCTAGAGCATATCCCACCTCCACTAAGTCCAAGACGATGTGGTCCAAAAGAACGTCACCTCAGATCCACTTGCTGTAGCTAAATCATATAACAGGGTC-  
ACGAAGAGATCTCGIATAGGTGAGGTGATCCAGGTTCTTCTGCIACAACCCAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTTAGTATATTGTCCCAG-

T V M G G F K V E N H T A C H C S T C Y Y H K S \*  
ACAGTAATGGGGGTTTCAAAGTGGAGAACACACGGCGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'  
TGTCAATACCCCCCAAAGTTTCACCTCTTGGTGTGCCGCACGGTGACGTCATGAACAATAATAGTGTTTAGAAATCCATGG-5'  
ggtacc(KpnI)

FIG. 6B

Coding Sequence for Single Chain Gonadotropin Analog #3 and Primers (underlined)

5'-ATGAATCGACCGAATCAGACTCGAGCCAAGGAATGGAGATGCTCCAGGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGGGGCATGGGCATCCAGGGAGCCGCTT-  
 M E M L Q G L L L L L L L S M G A W A S R E P L  
 3'-GGTTCCTTACCTTACGAGGTCCCCGACGACGACGACGACTCGTACCCGCCCGTACCCGTTAGGTCCTCGGCGAA-  
 ctcgag (XhoI)

R P W C H P I N A I L A V E K E G C P V C I T V N T T I C A G Y C P T M M  
 CGGCCATGGTGGCACCCTCAATGCCATCCTGGCTGTGGAGAAGAGGGCTGCCCGTGTGCATCACCGTCAACACCACCATCTGTGCCGGCTACTGCCCCCACCATGATG-  
 GCCGGTACCACGGTGGGGATGTTACGGTAGGACCGACACCTCTTCTCCGACGGGGCACACCTAGTGGCAGTTGTGGTGTAGACACGGGCCGATGACGGGGTGGTACTAC-

R V L Q A V L P P L P Q V V C T Y R D V R F E S I R L P G C P R G V D P V  
 CGCGTGTGAGGGCGTCTGCCGCCCTGCCTCAGGTGGTGTGCACCTACCGTGTGCGGCTTCGAGTCCATCCGGCTCCCTGGCTGCCCGCGTGGCGTGGACCCCGTG-  
 GCGCACGACGTCCCGCAGGACGGGACCGGAGTCCACCACACGTGGATGGCACTACACCGGAAGCTCAGTAGCCGAGGGACCGACGGGGCGACCCGACCTGGGGGCAC-  
 cctnagg (MstII)

V S F P V A L S C R C G P C R R S T S D C G G P K D H P L T C D H P Q G S  
 GTCTCCTTCCCTGTGGCTGTGAGTGTGGACCCCTGCCCGCCGACACCTCTGACTGTGGGGGTCCCAAGACCACCCCTTGACCTGTGACCACCCCAAGGATCC-  
 CAGAGGAAGGACACCGAGTCGACAGCGACACCTGGGACGGCGCGCTCGTGGAGACTGACACCCCGAGGTTTCTGGTGGGAACCTGGACACTGTTGGGGGTTCTTAGG-  
 (BamHI)ggatcc

FIG. 7A



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G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C  
GGTAGCGGATCTGGTAGCGCTCCTGATGTGCAGGATTGCCAGAAATGCACGCTACAGGAAACCCCACTTCTCCAGCCGGGTGCCCAATACTTCAGTGCATGGGCTGC-  
CCATCGCCTAGACCATCGCGAGGACTACACGTCCTTAACGGGTCTTACGTCCGATGTCCTTTGGGTAAGAAGAGGGTCCGCCACCGGGGTTATGAAGTCACGTACCCGACG-  
agcgct (Eco47III)

C F S R A Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V  
TGCTTCTTAGAGCATATCCCACCTCCACTAAGGTCCAAGACGATGTTGGTCCAAAAGAACGTCACCTCAGAGTCCACTTGCTGTAGCTAAATCATATAACAGGGTC-  
ACGAAGAGATCTCGTATAGGTGAGGTGATTCAGGTTCTTCTGCTACAACCAAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATATTGTCCCAG-

T V M G G F K V E N H T A C H C S T C Y Y H K S \*  
ACAGTAATGGGGGTTCAAAGTGGAGAACCCACACGGCGTGCCACTGCAGTACTTGTATTATATCACAATCTTAAGGTACC-3'  
TGTCATTACCCCCCAAAGTTTACCTCTTGGTGTGCGCGCAGGTGACGTCATGAACAATAATAGTGTTTAGAAATCCCATGG-5'  
ggtacc (KpnI)

FIG. 7B

Coding Sequence for Single Chain Gonadotropin Analog 4 and Primers (underlined)

5'-ATGAAATCGACGGAATCAGACTCGAGCCCAAGGATGAAGACACTCCAGTTCCTTCCTTTCTGTTGCTGGAAAGCAATCTGCTGCAATAGCTGTGAGCTGACCAAC-

3'-GGTTCCTACTCTGTGAGGTCAAAAAGAGAAAGCAACGACCTTTCGTTAGACGACGTATCGACACTCGACTGGTTG-  
ctcgag (XhoI)

I T I A I E K E E C R F C I S I N T T W C A G Y C Y T R D L V Y K D P A R  
ATCACCATTGCAATAGAGAAAGAAGATGTCGTTTCTGCATAAGCATCAACACCATTGGTGTGCTGGTACTGCTACACCAGGGATCTGGTGTATATAAGGACCCAGCCAGG-  
TAGTGGTAACGTTATCTCTTCTTACAGCAAAGACGTAGGCGTAGTTGTGGTGAACCAACGACCGCATGACGATGTGGTCCCTAGACCACATATTCCTGGGTCGGTCC-

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P K I Q K T C T F K E L V Y E T V R V P G C A H H A D S L Y T Y P V A T Q  
CCCCAAATCCAGAAACATGTACCTTCAAGGAACTGGTATATGAACAGTGAGAGTGCCCGGCTGTGCTACCATGCAGATTCCCTTGTATACATACCCAGTGGCCACCCAG-  
GGGTTTAGGTCCTTGTACATGGAAGTTCCTTGACCATATACTTTGTCACTCTCACGGGCGACACGAGTGGTACGCTCTAAGGAACATATGTATGGGTCACCGGTGGGTC-  
tgggcca (Bali)

C H C G K C D S D S T D C T V R G L G P S Y C S F G E M K E G S G S G  
TGTCACGTGGCAAGTGTACAGCGACAGCACTGATTGTACTGTGCGAGGCCCTGGGGCCAGCTACTGCTCCTTTGGTGAAATGAAAGAGGATCCGGTAGCGGATCTGGT-  
ACAGTGACACCGTTACACTGTGCTGTGCTGACTAACATGACACCGCTCCGGACCCCGGGTCCGATGACGAGGAAACCACTTTACTTTCTTCTAGGCCATCGCCTAGACCA-  
gggccc (ApaI) ggatcc (BamHI)

FIG. 8A

S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C C F S R A  
AGCGTCTGATGCGAGGATGCCAGAAATGCACGCTACAGGAAACCCATTCTTCTCCAGCCGGTGCCCAATACTTCAGTGCATGGGCTGCTTCTCTAGAGCA-  
TCGCGAGGACTACACGTCCTAACGGGTCTTACGTCCGATGTCCTTTGGGTAAAGAGGGTCGGCCACGGGGTTATGAAGTCACGTACCCGACGACGAAAGAGATCTCGT-  
agcgct (Eco47III)

Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V T V M G G  
TATCCCACTCCACTAAGTCCAAAGAACGATGTTGGTCCAAAGAACGTCACTCAGAGTCCACTTGGCTGTGTAGCTAATCATATAACAGGTCACAGTAATGGGGGT-  
ATAGGGTGAGGTGATCCAGGTCTTCTGCTACAACCAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATATTGTCCTCCAGTGTCAATACCCCCCA-

F K V E N H T A C H C S T C Y Y H K S \*

TTCAAAGTGGAGAACACACGGCGTGCCACTGCAGTACTTGTATTATCACAAATCTTAAGGTACC-3'

AAGTTTCACCTCTTGGTGTCCCGCACGGTGACGTCATGAACAATAATAGTGTTTAGAATTCCATGG-5'

ggtacc (KpnI)

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FIG. 8B

5' -ATGAAATCGACGGAATCAGACTCGAGCCAAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGGACATGGGCATCCAAAGAGCCGCTT-  
M E M F Q G L L L L L L L S M G T W A S K E P L  
3' -GGTTCTTACCTCTACAAGTCCCGACGACGACAACGACGACGACTCGTACCCGCCCTGTACCCGTAGTTCTCTCGCGCAA-  
ctcgag (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
CGCCACGGTGCCGCCCATCAATGCCACCTGGCTGTGGAGAAGGAGGCTGCCCCCGTGTGCATCACCGTCAACACCACCATCTGTGCCGGCTACTGCCCCACCATTGACC-  
GCCGGTGCCACGGCGGGGTAGTTACGGTGGGACCGACACCTCTTCCCTCCGACGGGGCACACGTAGTGGCAGTTTGTGGTGTAGACACGGCCCGATGACGGGGTGGATCTGG

[illegible]

V S Y A V A L S C Q C A L C D S D S T D C T V R G L G P S Y C S F G E M K  
GTCTCTACGCCGTGGCTTCAGCTGTCAATGTGCACTCTCGACACGCACAGCACTGATTGTA  
CTGTGCAGGCCTGGGGCCCACTACTGCTCCTTTGGTCAAATGAAA-  
CAGAGGATCGGCACCGACAGTCGACAGTTACACGTGACAGCGTGTGCTGTCTGACTAACATG  
ACACGCTCCGGACCCCGGGTTCGATGACGAGGAACCACTTTACTTT-  
ggggccc (ApaI)

**FIG. 9A**

E G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C  
 GAAGGATCCGGTAGCGATCTGGTAGCGCTCCTGATGTGCAGGATTGCCAGAAATGCACGCTACAGGAAACCCATTCTTCTCCAGCCGGTGCCCAATACTTCAGTGC-  
CTTCCTAGGCCATCGCCTAGACCATCGCGAGGACTACACGTCCTAAACGGGTCTTACGTGCGATGTCCTTTTGGGTAAGAAGAGGGTCGGCCCCACGGGGTTATGAAGTCACG-  
 ggtacc (BamHI)      agcgct (Eco47III)

M G C C F S R A Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y  
 ATGGGCTGCTGCTTCTTAGAGCATATCCCACCTCCACTAAGTCCAAAGAAGACGATGTTGGTCCAAAGAACGTCACCTCAGAGTCCACTTGTGTGTAGCTAAATCATAT-  
 TACCCGACGACGAGAGATCTCGTATAGGGTGAGGTGATTCACAGGTCTTCTGCTACAACCGAGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATA-

N R V T V M G G F K V E N H T A C H C S T C Y Y H K S \*  
 AACAGGGTCACAGTAATGGGGGTTTCAAAGTGGAGAACACACGGCGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'  
 TTGTCCCAGTGTCATTACCCCCCAAAGTTTCACCTCTTGGTGTGCCGACGGTGACGTCATGAACAATAATAGTGTTAGAATTCCATGG-5'  
 ggtacc (KpnI)

FIG. 9B

Coding Sequence for Single Chain Gonadotropin Analog #6 and Primers (underlined)

5' -ATGAATCGACGGAATCAGACTCGAGCCCAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGGACATGGGCATCCAGAGCCGCTT-  
 M E M F Q G L L L L L L L S M G G T W A S K E P L  
 3' -GGTTCCTACCTCTACAAGTCCCCGACGACACAACGACGACACTCGTACCCGCCCTGTACCCGTAGGTTCTTCGGCGAA-  
 ctcgag (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
 CGCCACGGTGCCCGCCCATCAATGCCACCCTGGCTGTGGAGAAGAGGGCTGCCCCGTGTGCATCACCGTCAACACCACCATCTGTCCGGCTACTGCCCCACCATGACC-  
 GCCGGTGCCACGGCGGGTAGTTACGGTGGGACCGACACCTCTCTCCGACGGGGCACACGTAGTGGCAGTTCTGTGGTAGACACGGCCGATGACGGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
 CGCGTGCTGCAGGGGTCCTGCCGGCCCTGCCTCAGGTGGTGTGGAATACCGCGATGTGCGCTTCGAGTCCATCCGGCTCCCTGGCTGCCCGCGGGCGGTGAACCCCGTG-  
 GCGCACGACGTCCCCCAGGACGGCGGGACGGAGTCCACCACACTTGATGGCGCTACACGGAAGCTCAGGTAGCCCGAGGCCGACGGCGCGCGCACTTGGGGCAC-  
 cctnagg (MstII)

V S Y A V A L S C Q C A L C R R S T T D C T V R G L G P S Y C S F G E M K  
 GTCTCTACGGCGTGGCTCTCAGCTGTCAATGTGCACTCTGCCGCCGCAGCACCACTGACTGCACGTGCGAGGCCTGGGGCCCAGCTACTGCTCCTTTGGTGAATGAAA-  
 CAGAGGATCGGGACCGACAGTCGACAGTTACACGTGAGACGGGGCGTCTGTTGACTGACGTGACACGCTCCGGACCCCGGGTCTGATGACGAGGAACCACTTTACTTT-  
 gggccc (ApaI)

FIG. 10A

E G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C  
 GAAGGATCCGGTAGCGGATCTGGTAGCGCTCCTGATGTGCAGGATTGCCAGAAATGCACGCTACAGGAAACCCATTCTTCCAGCCGGGTGCCCAATACACTCAGTGC-  
CTTCCTAGGCCCATCGCCTAGACCATCGCGAGGACTACACGTCCTAACGGGTCTTACGTGCGATGTCCCTTTGGGTAAGAAGAGGGTCGCCCCACGGGGTTATGAAGTCACG-  
 ggtacc (BamHI)      agcgct (Eco47III)

M G C C F S R A Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y  
 ATGGGCTGCTGCTTCTCTAGAGCATATCCCACTCCACTAAGTCCAAGAAGACGATGTTGGTCCAAAAGAACGTCACCTCAGAGTCCACTTGCTGTGTAGCTAAATCATAT-  
 TACCCGACGACGAAGAGATCTCGTATAGGGTGAGGTGATTCCAGGTTCTTCTGCTACAACCAAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATATA-

N R V T V M G G F K V E N H T A C H C S T C Y Y H K S \*  
 AACAGGGTCACAGTAATGGGGGTTTCAAAGTGGAGAACCCACACGGGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'  
 TTGTCCCAGTGTCAATTACCCCCCAAGTTTCACCTCTTGGTGTGCCCGACGGTGACGTCAATGAACAATAATAGTGTTAGAATTCATGG-5'  
 ggtacc (KpnI)

FIG. 10B

### Coding Sequence for Single Chain Gonadotropin Analog#7 and Primers

5' -ATGAAATCGACGGAAATCAGACTCGAGCCCAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTGCTGCTGAGCATGGCGGGACATGGGCATCCAAGGAGCCGCTT-  
M E M F Q G L L L L L L S M G T W A S K E P L  
3' -GGTTCTTACCTCTACAGGTCCCCGACGACGACGACAAACGACGACGACTCTGTAACCCGCCCTGTACCCGTAGGTTCTCTCGGCGAA-  
ctcgaq (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
CGGCCACGGTGCCGCCCCATCAATGCCACCCTGGCTGTGGAGAAGAGGGGCTGCCCCGTGTGCATCACCGTCAACACCACCATCTGTGCCGGGTACTGCCCCACCATGACC-  
GCCGGTGCCACGGCGGGGTACTTACGGTGGGACCGACACCTCTTCTCCCGACGGGGCACACGATGGCAGTTGTGGTGGTAGACACGGCCCGATGACGGGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
CGCGTGCTGCAGGGGTCTGCCGGCCCTGCCTCAGGTGGTGTGCAACTACCGCGATGTGCGCTTCAGTCCATCCGGCTCCCTGGCTGCCCGCGCGCGGTGAACCCCGTG-  
GCGCACGACGTCCCCAGGACGGCCGGACGGAGTCCACCACAGTTGATGGCGCTACACGCCAAGCTCAGGTAGGCCGAGGACGGCGCGCGCCTTGGGGCAC-

V S Y A V A L S C Q C A L C R R S T T D C T V R G L G P S Y C S F G E G S  
GTCTCTACGCCGTGGCTTCAGCTGTCAATGTGCACTCTGCCGCCGACCACTGACTGCACTGTGCGAGGCCTGGGCCCACTACTGCTCTTTGGTGAAGGATCC-  
CAGAGGATGCGGCACCGACAGTCGACAGTTACACGTGAGACGGCGGCTCGTGGTGA CTGACACGCTCCGGACCCCGGTCGATGACGAGGAACCACTTCTCTAGG-  
gggccc (ApaI) ggatcc (BamHI)

**FIG. 11A**



G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C  
 GGTAGCGGATCTGTAGCGCTCCTGATGTGCAGGATTGCCAGAAATGCACGCTACAGGAAAACCCATTCTTCTCCACCCGGGTGCCCCAATACITTCAGTGCATGGGCTGC-  
CCATCGCCTAGACCATCGCGAGGACTACACGTCCTAACGGGTCTTACGTCCGATGTCCTTTTGGGTAAGAAGAGGGTCCGCCACCGGGTTATGAAGTCAAGTACCGTACCCGACG-  
 agcgct(Eco47III)

C F S R A Y P T P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V  
 TGCTTCTCTAGAGCATATCCCACTCCACTAAGTCCAAGAGACGATGTTGGTCCAAAAGAACGTCACTCAGAGTCCACTTGCTGTGTAGCTAAATCATATAACAGGGTC-  
 ACCAAGAGATCTCGTATAGGGTGAGGTGATTCACAGGTTCTTCTGCTACAACCCAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCCGATTTAGTATATTGTCCCAG-

T V M G G F K V E N H T A C H C S T C Y Y H K S \*  
 ACAGTAATGGGGGTTTCAAAGTGGAGAACCCACACGGCGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'  
 TGTCAATTACCCCCCAAAGTTTCACTCTTGGTGTCCCGCACGGTGACGTCATGAACAATAATAGTGTTTAGAAATTCATGG-5'  
 ggtacc(KpnI)

FIG. 11B

## Coding Sequence for Single Chain Gonadotropin Analog #8 and Primers (underlined)

M E M F Q G L L L L L L L S M G T W A S K E P L  
 5' -ATGAAATCGACGGGAATCAGACTCGAGCCCAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTTGCTGCTGCTGAGCATGGGCGGACATGGGCATCCAAGGAGCCGCTT-  
 3' -GGTTCCTACCTCTACAAGTCCCGACGACGACAACGACGACGACTCGTACCCGCCCTGTACCCGTAAGTTCTTCGGCGAA-  
 ctcgag(XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
 CGGCCACGGTGCCGCGCCCATCAATGCCACCCTGGCTGTGGAGAGGAGGGTGCCCGTGTGCATCACCGTCAACACCACCATCTGTGCCGGCTACTGCCCCACCATGACC-  
 GCCGTGCCACGGCGGGGTAGTTACGGTGGGACCGACACCTCTTCTCCGACGGGGCACACGTAGTGGCAGTTGTGGTGGTAGACACGGGCCGATGACGGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
 CGCGTGTGCAGGGGGTCTGCCGGCCCTGCCTCAGGTGGTGTGCAACTACCGCGATGTGCGCTTCAGTCCATCCGGCTCCCTGGCTGCCCGCGCGGGGTGAACCCCGTG-  
 GCGACGACGTCCCCCAGGACGGCGGACGAGTCCACCACAGTTGATGGCGCTACACGCGAAGTCAAGTAGGCCGAGGACCCGACGGCGCGCGCCGCACTTGGGGCAC-  
 cctnagg(MstII)

V S Y A V A L S C Q C A L C R R S T T D C T V R G L G P S Y C D D P R G S  
 GTCTCTACGCGGTGGCTCTCAGCTGTCAATGTGCACTCTGCCGCGCGCAGCACCACTGACTGCACCTGTGCGAGGCCCTGGGGCCCCAGCTACTGCGATGACCCCGGGGATCC-  
 CAGAGGATCGGCACCGACAGTCGACAGTTACACGTGAGACGGCGGGCTCGTGGTACTGACGTGACACGCTCCGGACCCCGGGTCCGATGACGCTACTGGGCGCCCCCTAGG-  
 gggccc(ApaI) (SstII)ccgcggggatcc(BamHI)

FIG. 12A



Coding Sequence for Single Chain Gonadotropin Analog 9 and Cassette (underlined)

5' -ATGAAATCGACGGAATCAGACTCGAGCCCAAGGATGAAGACACTCCAGTTTTTCTTCTTCTGTTGCTGGAAAGCAATCTGCTGCAATAGCTGTGAGCTGACCAAC-  
 3' -GGTTCCTACTTCTGTGAGCTCAAAAAGAGAAAGCAACGACCTTTCGTTAGACGACGTTATCGACACTCGACTGGTTG-  
 ctcgag (XhoI)

I T I A I E K E E C R F C I S I N T T W C A G Y C Y T R D L V Y K D P A R  
 ATCACCATTGCAATAGACAAAAGAAGTGTGTTCTGCATAAGCATCAACACCATTGGTGTGCTGGCTACTGCTACACCAGGGATCTGGTGATATAAGGACCCAGCCAGG-  
 TAGTGGTAACGTTATCTCTTCTTTACAGCAAAGACGTAGGCGTACTTGTGTGAACCAACACGACCGATGACGATGTGCTCCCTAGACCACATATTCCTGGGTGGTCC-

20/28  
 P K I Q K T C T F K E L V Y E T V R V P G C A H H A D S L Y T Y P V A T Q  
 CCCAAAATCCAGAAAACATGTACCTTCAAGGAAGTGGTATATGAAACAGTGAGAGTGCCCGGCTGTGCTCACCATGCAGATTCCCTGTATACATACCCAGTGGCCACCCAG-  
 GGGTTTTAGGTCCTTGTACATGGAAGTTCCTTGACCATAFACCTTGTCACTCTCACGGGCCGACACGAGTGGTACGCTTAAGGAACATATGTATGGGTACCCGTGGGTC-  
 tggcca (BamI)

C H C G K C D S D S T D C T V R G L G P S Y C S F G E G S G S G S A P  
 TGTCACTGTGGCAAGTGTACAGCGACAGCACTGATTGTACTGTGCGAGGCCCTGGGGCCCGAGCTACTGCTCCTTGGTGAAGGATCCGGTAGCCGATCTGGTAGCGCTCCT-  
 ACAGTGACACCGTTCACTGTGCTGTGCTGACTAACATGACACCGTCCGGACCCCGGGTCCGATGACGAGGAACCACTTCTTAGGCCATCGCCTAGACCATCGCGAGGA-  
 gggccc (ApaI) (BamHI) ggatcc agcgct (Eco47III)

FIG. 13A

D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C C F S R A Y P T  
GATGTGAGGATTGCCAGAAATGCACGCTACAGGAAACCCATTCTCTCCAGCCGGGTGCCCAATACTCAGTGCATGGGCTGCTTCTCTAGACATATCCCAC-  
CTACACGTCCTAACGGGCTTACGTCCGATGTCCTTTTGGGTAAAGAGAGGTCCGCCACGGGGTTATGAAGTCACGTACCCGACGACGAAGAGATCTCGTATAGGTGA-

P L R S K K T M L V Q K N V T S E S T C C V A K S Y N R V T V M G G F K V  
CCACTAAGGTCCAAGAAGACGATGTTGGTCCAAAAGAACGTCACCTCAGTCCACTTGTGTGTAGCTAATCATATAACAGGTCACAGTAATGGGGGTTTCAAAGTG-  
GGTGATCCAGGTTCTTCTGGTACAACCAGGTTTCTTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATATTTGCCAGTGTCAATACCCCAAGTTTCAC-

E N H T A C H C S T C Y Y H K S \*

GAGAACACACGGCGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'

CTCTTGGTGTGCCGACGGTGACGTCAATGAACAATAATAGTGTAGTATCCATGG-5'

ggtacc (KpnI)

FIG. 13B

Coding Sequence for Single Chain Gonadotropin Analog 10 and Cassette (underlined)

5' -ATGAAATCGACCGGAATCAGACTCGAGCCCAAGGATGAAGACACATCCAGTTTTCTTCCTTTCTGTTGCTGGAAGCAATCTGCTGCAATAGCTGTGAGCTGACCAAC-  
 3' -GGTTCCTACTTCTGTGAGGTCAAAAAGAAAGACAACGACCTTTCGTTAGACGACGTTATCGACACTCGACTGGTTG-  
 ctcgag (XhoI)

I T I A I E K E E C R F C I S I N T T W C A G Y C Y T R D L V Y K D P A R  
 ATCACCATTGCAATAGAGAAAGAAGATGTCGTTTCTGCATAAGCATCAACACCACTTGGTGTGCTGGCTACTGCTACACCAGGGATCTGGTGTAAGGACCCAGCCAGG-  
 TAGTGGTAACGTTATCTCTTTCTTTACAGCAAAGACGTAGGCGTAGTTGTGTAACCAACACGACCGATGACGATGTGTCCTTAGACCACATATTCCTGGGTGGTCC-

22/28  
 P K I Q K T C T F K E L V Y E T V R V P G C A H H A D S L Y T Y P V A T Q  
 CCCAAAATCCAGAAAACATGTACCTTCAAGGAACTGGTATATGAACAGTGAGAGTGCCCGGCTGTGCTCACCATGCCAGATTCCTTGTATACATACCCAGTGGCCACCCAG-  
 GGGTTTAGGTCTTTGTACATGGAAGTTCCTTGACCATATACTTTGTCACTCTCACGGGCCGACACGAGTGGTACGCTTAAGGAACATATGTATGGGTACCCGGTGGGTC-  
 tggcca (Bali)

C H C G K C D S D S T D C T V R G L G P S Y C G S G S G S A P D V Q D  
 TGTCAGTGGCAAGTGTACAGCGACAGCACTGATTGTACTGTGCGAGGCTGGGGCCCACTACTGCGGATCCGGTAGCGGATCTGGTAGCGCTCCTGTATGTGCAGGAT-  
 ACAGTGACACCGTTCACTGTCTGCTGCTGACTAACATGACACGCTCCGGACCCCGGGTCTCGATGACGCCCTAGGCCATCGCCTAGACCATCGCGAGGACTACACGTCCTA-  
 gggccc (ApaI) (BamHI)ggatcc agcgt(Eco4VII)

FIG. 14A

C P E C T L Q E N P F F S Q P G A P I L Q C M G C C F S R A Y P T P L R S  
TGCCCAGAAATGCACGTACAGGAACCCATTCTCTCCAGCCGGTGCCCCAATACTTCAGTGCATGGGCTGCTGCTTCTAGAGCATATCCCACTCCACTAAGGTCC-  
ACGGGTCTTACGTGGCATGTCCTTTTGGTAAGAAGAGGGTCGGCCACGGGGTTATGAAGTCACGTACCGACGACGAAGAGATCTCGTATAGGTGAGGTGATTCAGG-

K K T M L V Q K N V T S E S T C C V A K S Y N R V T V M G G F K V E N H T  
AAGAAGACGATGTTGTCCAAAGAACGTACCTCAGAGTCCACTTCTGTGTAGCTAAATCATATACAGGGTCACAGTAATGGGGGTTTCAAAGTGGAGAACACACG-  
TTCTTCTGCTACACCAGGTTTCTTGCA GTGGAGTCTCAGGTGAACGACACATCGATTTAGTATATTGTCCAGTGTCAATACCCCCCAAAGTTTCACTCTTGGTGTGC-

A C H C S T C Y Y H K S \*  
GCGTGCCACTGCAGTACTTGTATTATCACAATCTTAAGGTACC-3'  
CGACGGTGACGTCATGAACAATAATAGTGTTTAGAATTCATGG-5'

ggtacc (KpnI)

FIG. 14B

Preparation of an alpha-subunit coding region lacking oligosaccharide      signal sequences

C G S G S G S A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C  
 TGGGATCCGGTAGCGGATCTGGTAGCGCTCCTGATGTGCAGGATTGCCCAGAATGCACGCTACAGGAAACCCATTCTTCTCCAGCCGGGTGCCCAATACTTCAGTGC-  
 ACGCCTAGGCCATCGCCTAGACCATCGCGAGGACTACACGTCCTAACGGGTCTTACGTGCGATGTCCCTTTTGGGTAAGAAGAGGGTCGGGCCACGGGGTTATGAAGTCACG-  
 (BamHI)ggatcc    agcgt(Eco47III)

M G C C F S R A Y P T P L R S K K T M L V Q K Q V T S E S T C C V A K S Y  
 ATGGGCTGCTGCTCTCTAGAGCATATCCCACCTCCACTAAGGTCCAAGAGACGATGTTGGTCCAAAAGCAAGTCACCTCAGAGTCCACTTGTGTGTAGCTAAATCATAT-  
 TACCCGACGACGAAGAGATCTCGTATAGGGTGAGGTGATCCAGGTCTTCTGCTACAACCAGGTTTTCGTGCAGTGGAGTCTCAGGTGAACGACACATCGATTAGTATA-  
 tctaga(XbaI)

N R V T V M G G F K V E Q H T A C H C S T C Y Y H K S \*  
 AACAGGGTCACAGTAATGGGGGTTTCAAAGTGGAGCAACACACGGCGTGCCACTGCAGTACTTGTATTATATCACAATCTTAAGGTACC-3'  
 TTGTCCCAGTGTCATTACCCCCCAAAGTTTCACCTCGTTGTGTGCCGACGGTGACGTCATGAACAATAATAGTGTTTAGAATTCCATGGCCATG-5'  
 ggtacc(KpnI)

FIG. 15



Preparation of a beta-subunit coding region lacking asn-linked oligosaccharide signal sequences

5' -ATGAAATCGACCGAATCAGACTCGAGCCCAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGGGACATGGGCATCCAAGGAGCCGCTT-  
M E M F Q G L L L L L L L S M G G T W A S K E P L  
3' -GGTTCCTACCTCTACAAAGGTCCTCCCGACGACGACACAACGAGACGACTCGTACCCGCCCTGTACCCGTAGGTTCTTCGGCGAA-  
ctcgag (XhoI)

R P R C R P I Q A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
CGGCCACGGTGGCGGCCCATCCAAGCCACCCTGGCTGTGGAGAAGAGGGCTGCCCGGTGTGCATCACCGTCAACACCACCATCTGTGCCGGGTACTGCCCCACCATGACC-  
GCCGGTGCCACGGCGGGGTAGGTTCCGTGGGACCGACACCTCTTCTCCGACGGGGCACACGTAAGTGGCAGTTGTGGTGTAGACACGCGCGCATGACGGGGTGGATCTGG-  
R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
CGCGTGTGCAGGGGGTCTTGGCGGCCCTGCCTCAGGTGGTGTGCAACTACCGCGATGTGGCGTTCGAGTCCATCCGGCTCCCTGGCTGCCCGCGCGCGGTGAACCCCGTG-  
GGCACGACGTCCCCCAGGACGGGAGTCCACCACACGTTGATGGCGCTACACGCGAAGCTCAGGTAGGCCGAGGACCGACGCGGCGCGCGGCACTTGGGGCAC-  
cctnagg (MstII)

FIG. 16A

V S Y A V A L S C Q C A L C R R S T T D C G G P K D H P L T C D D P R F Q  
 GTCTCCTACGCCGTGGCTCTCAGCTGTCAATGTGCACTCTGCCGCCGAGCACCACCTGACTCGGGGGTCCCAAGGACCACCCCTTGACCTGTGATGACCCCGCTTCCAG-  
 CAGAGGATCGGGCACCGACAGTCGACAGTTACACGTGAGACGGCGCGCTCGTGGTGA CTGACGCCCCAGGGTTCTTGGTGGGAACTGGACACTACTGGGGGCGAAGGTC-  
 D S S S K A P P S L P S P S R L P G P S D T P I L P Q G S G S G S  
 GACTCCTCTTCCCTCAAAGGCCCTTCCCCAGCCTTCCAAGCCATCCCGACTCCCGGGCCCTCGGACACCCCGATCCTCCCCCAAGGATCCGGTAGCGGATCTGGTAGC-  
 CTGAGGAGAAGGAGTTTCCCGGGAGGGGGTCCGAAAGTTCCGGTAGGGCTGAGGGCCCCGGGAGCCCTGTGGGGCTAGGAGGGGGTTCCTAGGCCATCGCCTAGACCATCG-  
 gggccc (ApaI)                      ggatcc (BamHI)                      agc

A P D V Q D C P  
GCTCCTGATGCGAGGATTGCCCCA  
 CGAGGACTACACGTCCTTAACGGGT  
 gct (Eco47III)

FIG. 16B

Coding Sequence for Single Chain Gonadotropin Analog #1a

M E M F Q G L L L L L L L S M G T W A S K E P L  
 5' -ATGAAATCGACGGGAATCAGACTCGAGCCCAAGGATGGAGATGTTCCAGGGGCTGCTGCTGTTGCTGCTGAGCATGGCGGGGACATGGGCATCCAAGGAGCGGCTT-  
 3' -GGTTCCTACCTCTACAAGGTCCTCCGACGACGACACAACGACGACGACTCGTACCGCCCTGTACCCGTAGGTTCTCTCGGCGAA-  
 ctcgag (XhoI)

R P R C R P I N A T L A V E K E G C P V C I T V N T T I C A G Y C P T M T  
 CGCCACGGTGGCGGCCCATCAATGCCACCCTGGCTGGAGAGGAGGGGTGCCCGGTGTCATCACCGTCAACACCACCATCTGTCCGGCTACTGCCCCACCATGACC-  
 GCCGGTGCCACGGCGGGGTAGTTACGGTGGGACCGACACCTCTTCTCCGACGGGGCACACGTAAGTGGCAGTTGTGGTGTAGACACGGCCGATGACGGGGTGGATCTGG-

R V L Q G V L R A L P Q V V C N Y R D V R F E S I R L P G C P R G V N P V  
 CGCGTGTGCAGGGGGTCTGCCGGCCCTGCCTCAGGTGGTGTGCAACTACCGCGATGTGCGCTTCGAGTCCATCCGGCTCCCTGGCTGCCCGCGCGGTGAACCCCGTG-  
 GCGCACGAGTCCCCCAGGACGGCGGGACGGAGTCCACCACAGTTGATGGCGCTACACGCGAAGCTCAGGTAGGCGGAGGACCGACGGCGCGCCGACACTTGGGGCAC-  
 cctnagg (MstII)

V S Y A V A L S C Q C A L C R R S T T D C G G P K D H P L T C D D P R F Q  
 GTCTCTACGCCGTGGCTCTCAGCTGTCAATGTGCACTCTGCCGCGCGCAGCACCACTGACTGCGGGGGTCCCAAGGACCAACCCCTTGACCTGTGATGACCCCGGCTTCCAG-  
 CAGAGGATGCGGCACCGACAGTCGACAGTTACAGTGAGACGGCGGCGTCTGTGTGACTGACGCCCCCAGGGTTCTGTGGGGAACCTGGACACTACTGGGGGCGGAAGGTC-

FIG. 17A

D S S S K A P P P S L P S P S R L P G P S D T P I L P Q G S G S G S  
GACTCTCTCTCAAAGGCCCTCCCCCAGCCTTCCAAGCCCATCCGACTCCCGGGCCCTCGGACACCCGATCTCCCCAAGGATCCGGTAGCGGATCTGGTAGC-  
CTCAGGAGAAGGAGTTTCCGGGGAGGGGGTTCGGAAGGTTCCGGTAGGGCTCAGGGCCCCGGGAGCCTGTGGGGCTAGGAGGGGGTTCCTAGGCCATCGCCCTAGACCATCG-

A P D V Q D C P E C T L Q E N P F F S Q P G A P I L Q C M G C C F S R A Y  
 GCTCCTGATGTGCAGGATTGCCAGAAATGCACGGCTACAGGAAACCCATTCTTCCAGCCGGTGCCCAATACCTCAGTGCATGGGCTGCTGCTTCTCTAGAGCATAT-  
 CGAGGACTACACGTCCTAACGGGTCCTACGTCCGATGTCCCTTTTGGGTAAGAAAGAGGGTCGGCCCCACGGGGTTATGAAGTCACGTACCCGACGACGAAGAGATCTCCGTATA-  
 gct(Eco47III)

P T P L R S K K T M L V Q K Q V T S E S T C C V A K S Y N R V T V M G G F  
CCC ACTCCAAGTCCAAGACGATGTTGGTCCAAAAGCAAGTCACCTCAGAGTCCACTTGCCTGTAGCTAAATCATATAACAGGGTCACAGTAATGGGGGGTTTC-  
GGGTGAGGTGATTCACAGGTTCTTCTGCTACAACCAGGTTTTCGTTTCAGTGGAGTCTCAGGTGAACGCACACATCGATTTAGTATATTGTCCCAAGTGCATTACCCCCCAAAG-

K V E Q H T A C H C S T C Y Y H K S \*

AAACTGAGCAACACACGGCGTGCCACTGCAGTACTGTTATTATCACAAATCTTAAGGTACC-3'

TTTCACCTCGTTGTGTGCCGCACGGTGACGTCATGAACAATAATAGTGTTTAGAATTCATGGCCTAGGTAGAGTTCGATTAGGCT-5'

(KpnI) ggtaccgqatcc (BqIII)

**FIG. 17B**